

SIX NEW COMBINATIONS IN *BACCHAROIDES*
MOENCH AND *CYANTHILLIUM* BLUME
(VERNONIEAE: ASTERACEAE)

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Abstract.—Three species, *Vernonia adoensis* Schultz-Bip. ex Walp., *V. guineensis* Benth., and *V. lasiopus* O. Hoffm. in Engl., are transferred to the genus *Baccharoides* Moench, and three species, *Conyza cinerea* L., *C. patula* Ait., and *Herderia stellulifera* Benth. are transferred to the genus *Cyanthillium* Blume.

The present paper provides six new combinations of Old World Vernonieae that are known to belong to the genera *Baccharoides* Moench and *Cyanthillium* Blume. The applicability of these generic names to these species groups was first noted by the author almost ten years ago (Robinson et al. 1980), and it was anticipated that other workers more familiar with the paleotropical members of the Vernonieae would provide the necessary combinations. A recent study of eastern African members of the tribe by Jeffrey (1988) also cites these generic names as synonyms under his *Vernonia* Group 2 subgroup C and *Vernonia* Group 4, although he retains the broad concept of *Vernonia*. At this point it is not certain when anyone will undertake more detailed studies of these groups. However, the author does need to refer to a few members of these genera and does not intend to use older, incorrect names. Instead of making isolated combinations as needed, as was done with *Gymnanthemum coloratum* (Robinson & Kahn 1986), an effort is made here to place needed combinations together in one paper. Detailed monographic studies and the majority of the combinations are left to future workers. In spite of the limited scope of the present effort, some explanation is offered.

The summary of the Vernonieae by S. B. Jones (1977) showed that the Eastern Hemisphere species placed in the genus *Vernonia* were all chemically and cytologically dis-

tinct from the Western Hemisphere members of that genus. Although generic limits were not discussed by Jones, his study placed the Old World *Vernonia* in a group on the opposite side the basic division in the genus from typical *Vernonia* in the eastern United States. Subsequent studies by Jones (1979b, 1981) showed that certain pollen types also were restricted to Old World members of *Vernonia* s.l., types that are shared by some Old World members of the tribe traditionally placed in other genera. The characters noted by Jones have been treated by the present author as evidence of a basic division in the Vernonieae between groups that have included many genera in each hemisphere, and traditional *Vernonia* s.l. can be seen as an excessively paraphyletic core genus that is defined only by what "it is not" rather than by what "it is." In progressing toward definitive generic concepts in the Vernonieae, the pattern seen by Jones justifies removing at least all of the Eastern Hemisphere members of the tribe from *Vernonia*. This segregation of the Old World genera was partially put into practice by the use of the names *Baccharoides* Moench, *Gymnanthemum* Cass., and *Cyanthillium* Blume, by Robinson et al. (1980) and in the transfers made in the study of *Distephanus* Cass. (Robinson & Kahn 1986).

At present there is good reason not to transfer all the Old World species of *Vernonia* out of the genus. Morphological and

anatomical studies show the problem is more complex than one Old World genus versus one New World genus. Several genera should be recognized in both the neotropical and paleotropical elements of *Vernonia* s.l. More detailed studies of the type under way in neotropical species (Robinson 1987a, b, c, 1988a, b, c, 1989; Robinson & Funk 1987) are needed before all transfers can be made properly. Nevertheless, the position of some of the species is fully resolved, especially of species belonging to older segregate genera such as *Baccharoides* and *Cyanthillium*.

The lack of total resolution of the tribe is not a reason to retain under *Vernonia* s.l. names and concepts known to be obsolete. The author believes that *Vernonia* will ultimately be restricted to Western Hemisphere species with non-lophate type A pollen and a chromosome number of $N = 17$ and will perhaps be restricted to only the eastern North American element of that group.

The detailed variations of pollen in the tribe are to be more fully compared and illustrated elsewhere. The generic synonymies follow mostly those of Jeffrey (1988), but some additional synonymy is provided under *Cyanthillium*.

Baccharoides Moench

Baccharoides Moench, Methodus. 528.

1794. Type: *Conyza anthelmintica* L. (= *B. anthelmintica* (L.) Moench).

Ascaricida Cass., Dict. Sci. Nat. 3, suppl. 38. 1817, nom. superfl. Type: *Conyza anthelmintica* L.

Candidea Tenore, Atti Reale Accad. Sci. Sez. Soc. Reale Borbon 4 (Cl. Botan.): 104, t. 1, 2. 1839. Type: *Candidea senegalensis* Tenore.

Vernonia subsect. *Stengelia* Schultz-Bip. ex Walp., Repert. Bot. Syst. 2: 946. 1843.

Vernonia adoensis Schultz-Bip. ex Walp. *Stengelia* Steetz in Peters, Naturw. Reise Mossambique, Bot. 360. 1864. Type: *Vernonia schimperii* DC.

Vernonia sect. *Stengelia* (Schultz-Bip. ex Walp.) Benth. in Benth. & Hook. f., Gen. Pl. 2: 127. 1873.

This group of species has been imperfectly recognized in the past, primarily on the basis of expanded foliose appendages on the involucre bracts. The character is well developed in the genus but is not a reliable basis for distinction. Smith (1971) studied a group titled the "stengeloid species" of *Vernonia*, but many species included in the study were not *Baccharoides*. Smith recognized the heterogeneity in the group he treated, especially in the form of the pollen and in the shape of the corolla, but these were not detailed for all of the species.

More recently, Kingham (1976), Jones (1981), Jeffrey (1988), and the present author have studied *Baccharoides* pollen in more detail. It is lophate and distinctive among Old World tricolporate Vernoniaceae by the presence of polar areoles. The grains fall into Jones' (1981) Type C, although pollens of all species studied in detail are different from most Type C pollen of the Neotropics by the 3 equatorial areoles of the intercolpi and the strong basal columellae under the crests of the exine.

Jeffrey (1988) emphasized the pollen, the flattened inner pappus bristles, and the corollas with long, slender, basal tubes and abruptly expanded cylindrical limbs and comparatively short erect lobes as definitive characters of *Baccharoides* within *Vernonia* s.l.

Ignoring some older counts, the genus seems to have a consistent chromosome number of $N = 10$ (Smith 1971, Jones 1979a). The group is also notable for the presence of epoxy resins and has been studied for possible commercial exploitation. Neither the chromosome number nor the chemistry is unique to the genus.

Many of the species are understood well enough to justify new combinations, but most of these, and others not known to the present author, are left for final resolution by other workers. The species listed by Smith

(1971) are an artificial group and the Smith paper should not be used without reference to the discussion by Jeffrey (1988). Except for its discussion of the Smith paper, the Jeffrey study itself is limited to East African species. It seems that a monograph of the genus would be comparatively simple for someone with better resources to study paleotropical plants, for most of the species occur in Africa. One species was described from Arabia, and the widely distributed type species was described from Sri Lanka.

The three species combinations needed at present are as follows:

BACCHAROIDES ADOENSIS

(Schultz-Bip. ex Walp.)

H. Robinson, comb. nov.

Vernonia adoensis Schultz-Bip. ex Walp., *Repert. Bot. Syst.* 2:946. 1843. For extensive synonymy see Smith (1971) and Jeffrey (1988). Distribution is subsaharan Africa with concentration in the east (Smith 1971, map p. 19).

BACCHAROIDES GUINEENSIS

(Benth. in Hook. f. & Benth.)

H. Robinson, comb. nov.

Vernonia guineensis Benth. in Hook. f. & Benth., *Niger Fl.* 427. 1849. For extensive synonymy see Smith (1971). Distribution is subsaharan Africa from Sierra Leone in the west eastward to western Tanzania and south to southwestern Angola and northern Zimbabwe (Smith 1971, map p. 48).

BACCHAROIDES LASIOPUS

(O. Hoffm. in Engl.)

H. Robinson, comb. nov.

Vernonia lasiopus O. Hoffm. in Engl., *Pflanzew. Ost. Afrika* 403. 1895. For extensive synonymy see Smith (1971). The species ranges from western Ethiopia to northeastern Angola and northeastern Zimbabwe (Smith, 1971, map p. 38).

Cyanthillium Blume

Cyanthillium Blume, *Bijdr. Fl. Ned. Ind.* 889. 1826. Lectotype (designated here): *Cyanthillium villosum* Blume.

Isonema Cass., *Bull. Soc. Philom. Paris* 1817:152. 1817, nom. illeg., non R. Br. (1810). Type: *Isonema ovata* Cass.

Cyanopis Blume ex DC., *Prodr.* 5:69. 1836, nom. illeg. et superfl., non Cass. (1817). Lectotype (Jones 1980): *Cyanthillium villosum* Blume.

Vernonia sect. *Tephrodes* DC., *Prodr.* 5:24. 1836. Lectotype (Jones 1981): *Conyza cinerea* L.

Claotrachelus Zoll. & Mortiz ex Zoll., *Natuur-Geneesk. Arch. Ned Indië* 2:263, 565. 1845. Type: *Claotrachelus rupestris* Zoll. & Moritz ex Zoll.

Seneciodes L. ex Post & O. Kuntze, *Lex. Gen. Phan.* 2:515. 1903. Type: *Conyza cinerea* L.

Triplotaxis Hutch., *Bull. Misc. Inform.* 1914:355. 1914. Lectotype: *Herderia stelulifera* Benth. in Hook.

Vernonia subsect. *Orbivestus* S. B. Jones, *Rhodora* 83:61. 1981. Lectotype (Jeffrey 1988): *Vernonia karaguensis* Oliv. & Hiern.

Vernonia subsect. *Hilliardianae* S. B. Jones, *Rhodora* 83:66. 1981. Lectotype (Jeffrey 1988): *Webbia oligocephala* DC.

Vernonia subsect. *Tephrodes* (DC.) S. B. Jones, *Rhodora* 83:70. 1981.

The designation of a new lectotype for *Cyanthillium* rejects the earlier choice of *C. moluccense* that seems to date from Jones (1980). Jones' selection was totally arbitrary, being the first species listed by Blume without any evident study of the group involved, and thus can be rejected under the Code. The lectotype cited by Jeffrey (1988) evidently follows Jones. Jones' lectotypification is unsuitable because the species is virtually unknown, being available to most botanists only as a microfiche of the fragment in the DeCandolle herbarium at Geneva. The fragment *C. moluccense* as seen

in the microfiche may be a *Cyanthillium*. The choice in this paper brings the typification into conformity with those of the synonyms, the superfluous generic name *Cyanopsis* Blume and the homonym *Isonema* Cass., which both equal *Cyanthillium patula*.

It is unfortunate that many Flora formats now require types to be selected for all generic names, even those treated as synonyms. Although the intention is noble, the result is too often poorly chosen lectotypes, made by unqualified investigators.

Any study of *Cyanthillium* should include a study of members of *Erlangea* Schultz-Bip. (1853). The type, *E. plumosa* Schultz-Bip., of Gabon, is known to the author only from its description. *Erlangea* is technically distinguished from *Vernonia* s.l. and that part recognized here as *Cyanthillium* by the five, deciduous pappus segments that have been referred to as plumose. The type of *Erlangea* is described with sessile amplexicaule leaves, a feature that would be unusual in the usually narrowly petiolate *Cyanthillium*. As described, the type of *Erlangea* has a habit similar to *Vicoa* (*Inula*) *auriculata* Cass. and it may be close to *Erlangea schinzii* O. Hoffm. of northernmost Namibia, which also has sessile leaves. Examination of material matching the description of the type, and further evaluation of the pappus distinction, may show that the genus falls fully into the synonymy of *Cyanthillium*.

The genus *Cyanthillium* owes its early recognition to the presence of a deciduous pappus in the species group that includes the lectotype species. The broad achene and short deciduous pappus of *C. patula* places this species outside of typical *Vernonia*. Other pappus variations occur in *Cyanthillium* and have been the basis of further generic distinctions. The type species of *Triplotaxis* has a very distinctive, collar-like outer pappus that persists after the inner pappus has completely fallen. Other species from Africa that are described as having a pappal

ring don't have the highly distinctive structure seen in *Triplotaxis* but have only a moderately expanded upper callus on the achene of a form seen in many Asteraceae. The latter species are not closely related to *Cyanthillium*. Other members of *Cyanthillium*, such as *C. cinereum*, have achene and pappus structures like those of typical *Vernonia*, without unusual rings or fragility. Because of the differences in pappus structure listed above, the species now placed in *Cyanthillium* were not suspected of forming a related group separate from *Vernonia* until the pollen study by Kingham (1976) and the recent study by Jeffrey (1988). Nevertheless, the species seem to share a generally herbaceous habit, herbaceous and usually narrowly petiolate leaves, and broadly to narrowly ovate, slightly acuminate involucre bracts, often with greenish outer surfaces and purplish margins. Jeffrey (1988) mentions various forms of T-shaped hairs in members of the group.

The pollen type of *Cyanthillium* is one of the many paleotropical types in the Vernonieae in which the colpus is not evident. Studies by the author show that the polar areas of the grains have a polar areole surrounded by a tier of five to seven areoles that variously match or straddle or fall between the pores below them. The polar organization is basically different from forms in the tribe that have well developed colpi. In the present group there is not even a consistent single areole above or below the pores. The major organizational feature of the grain is centered on the poles rather than the pores. SEM studies show that members of *Cyanthillium* are distinctive within the non-colporate species of the Old World by the modification of the basal columellae of the exine to form bridges under the crests. Points of attachment of the exine to the footlayer seem to be restricted to positions under the intersections of the crests. The precise pollen form is not presently known outside the genus, although similar forms without modified basal columellae are

known in species belonging to the group cited by Jeffrey (1988), for which the name *Crystallipollen* Steetz in Peters seems to have priority.

The few available chromosome numbers in *Cyanthillium* fall within the range noted for paleotropical members of the tribe. Jones (1979a) reported $N = 20$ for *C. stelluliferum* (as *Triplotaxis*). This seems to be based on $X = 10$. Jones reported $N = 9, 18$, and ca. 18 for the widespread adventive *C. cinereum*. Jones also reported $N = 10$ for two species of the closely related genus *Erlangea*, including *E. remifolia* Wild & Pope, which I suspect is a member of *Cyanthillium*.

Cyanthillium has problems not seen in *Baccharoides*, and a monograph will be more difficult. The distribution is throughout the paleotropical region, and there are many variations within the group in obvious characters such as the achene and pappus.

The three combinations needed at present are as follows:

CYANTHILLIUM CINEREUM (L.)

H. Robinson, comb. nov.

Conyza cinerea L., Sp. Pl. 862. 1753.

Vernonia cinerea (L.) Less., Linnaea 4:291. 1829.

Senecioniodes cinerea (L.) Post & O. Kuntze, Lex. Gen. Phan. 2:515. 1903.

The species is the most widely distributed member of the genus. It occurs throughout the paleotropical region and is widely adventive in the Neotropics.

CYANTHILLIUM PATULUM (Ait.)

H. Robinson, comb. nov.

Conyza patula Ait., Hortus Kew. 3:184. 1789.

Isonema ovata Cass., Bull. Soc. Philom. Paris 1817: 152. 1817.

Conyza chinensis Lam., Encycl. 2:83. 1786, hom. illeg., non L.

Cyanthillium villosum Blume, Bijdr. Fl. Ned. Ind. 889. 1826.

Cyanthillium pubescens Blume, Bijdr. Fl. Ned. Ind. 890. 1826.

Centratherum chinense [Lam.] Less., Linnaea 4:320. 1829.

Vernonia chinensis (Less.) Less., Linnaea 6: 105, 674. 1831.

Cyanopis madagascariensis DC., Prodr. 5: 69. 1836.

Vernonia pratensis Klatt, Ann. K. K. Naturhist. Hofmus. 7:99. 1892.

Cacalia patula (Less.) O. Kuntze, Rev. Gen. Pl. 324. 1894.

Cyanthillium chinense (Lam.) Gleason, Bull. Torrey Bot. Club 40:306. 1913.

The species is cited by Gleason (1922) as occurring in tropical Asia, the East Indies, and being introduced into Guadeloupe. The species is now also credited to Madagascar on the basis of the newly synonymized *Cyanopsis madagascariensis* and *Vernonia pratensis*.

CYANTHILLIUM STELLULIFERUM (Benth.)

H. Robinson, comb. nov.

Herderia stellulifera Benth. in Hook. f. & Benth., Niger Fl. 425. 1849.

Triplotaxis stellulifera (Benth.) Hutch., Bull. Misc. Inform. 1914:356. 1914.

The distribution given by Jeffrey (1988) is Uganda, west and central tropical Africa and Angola.

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